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# Food & Nutrition Research Briefs

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## **Folate Deficiency Rapidly Raises Risk**

Skimping on folate, a B vitamin also known as folic acid, may raise levels of homocysteine in the blood in about a month, according to recent findings. High levels of the amino acid homocysteine have been linked to low folate and have been blamed for increased risk of heart attack or stroke.

Ten healthy males, age 33 to 46, volunteered for the 108-day study conducted by ARS researchers and a University of California at Los Angeles collaborator. At different times during the research, the volunteers received 12 percent, 84 percent, or 220 percent of the folate Recommended Dietary Allowance. For men, the current RDA is 200 micrograms (mcg). Four of the volunteers showed moderately elevated levels of homocysteine after only 30 to 45 days of the lowest-folate intake—12 percent of the RDA. Their homocysteine levels did not decrease significantly while getting 84 percent, but quickly dropped to normal with 220 percent.

The findings, published in the *Journal of Nutrition* (vol. 124, no. 7) prompted the researchers to suggest that increasing the RDA would allow a greater margin of safety for unexpected periods of decreased folate intake or other factors, such as individual—perhaps genetic—variations in the body's demand for this nutrient.

The two experimental, low-folate-intake periods in this study made it unique. Other studies of folate-homocysteine interactions either did not alter the volunteers' folate intake or looked at the effect of adding the nutrient, not cutting it back. Folate is essential for growth and health of cells and for proper functioning of the brain and hormones. Good sources include spinach, broccoli and other leafy green vegetables, dried legumes such as lentils and pinto or garbanzo beans, orange juice, fortified breakfast cereals and peanuts.

*For more information, contact Robert A. Jacob, (415) 556-3531, Western Human Nutrition Research Center, San Francisco, CA; no e-mail address.*

## **Resting Metabolism Lies Down on the Job**

Older men don't burn off as many calories after overeating as their younger counterparts, recent findings confirmed. So they may have to compensate by doing a little more exercise—such as taking a walk after dinner. Studies have implied that aging hampered the body's ability to increase its resting metabolic rate—the energy needed to keep the resting body functioning—and thus 'waste' the

## **What and Where Our Children Eat — 1994 Nationwide Survey Results**

More U.S. children are eating away from home now than in the late 1970's. They're also consuming more beverages and grain-based snacks and combination foods, such as pizza. And they're eating less fat and drinking less milk, according to data from the first year of the current three-year USDA nationwide food consumption survey—What We Eat In America.

On any given day in 1994, nearly half of three- to five-year-olds and roughly two-thirds of school-age youths six through 19 consumed some food or drink provided outside the home. On average, outside food contributes about 20 percent of total calories for three- to five-year olds, increasing to 25 percent for six- to 11-year-olds and 33 percent for 12- to 19-year-olds.

But one in three school-age kids gets more than 40 percent of total calories from outside food. "That's quite a bit of their day's intake," said survey specialist and nutritionist Sharon Mickle. "Choosing a healthful diet is just as important when eating meals away from home."

Where are our kids eating out? The three- to five year-olds most often ate at someone else's house, followed by fast food restaurants and then day care. Grade-school-age children most often ate at the school cafeteria, followed by someone else's house and fast food restaurants. By the teen years, however, fast food restaurants were the most frequent source of outside food for boys and a close second to the school cafeteria for girls.

Another upward trend was seen in beverage consumption, Mickle said. "Except for milk, U.S. kids are drinking more beverages across the board." The biggest increase has been in consumption of non-citrus juices, which include apple juice, grape juice and juice blends. Two to three times more children and teens drank non-citrus fruit juices in 1994 than in 1977-78. And preschoolers consumed four times more of it, with apple juice the most popular.

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## **Survey Results** *continued from page 1*

Soft drink consumption also dramatically increased among all groups, especially among teenage boys. Nearly three-fourths of teenage boys drank an average of 34 ounces—almost three 12-oz. cans' worth—per day in 1994, and two-thirds of teenage girls had 23 ounces—about two cans' worth.

Milk consumption, on the other hand, dropped markedly across all age and gender groups since the late 1970's. A little more than half of teens drank milk in 1994, compared to some three-fourths in the late 1970's. Average intakes in 1994 ranged from 12 ounces for preschoolers and school-age girls to around 16 ounces for school-age boys. Low-fat and skim milk are now consumed more frequently than whole milk among all but the five-and-under group, she said.

Other trends identified in 1994:

- \* U.S. kids reflected the national trend in consumption of crackers, popcorn, pretzels and corn chips. The proportion of children and teens consuming these grain-based snack foods doubled between 1977-78 and 1994. They're slightly more popular among girls. Thirty-five percent of school-age girls ate at least one of these snack foods in a day in 1994.

- \* Grain-based combinations, such as pasta with sauce, rice dishes and pizza, also were more popular in 1994. About 45 percent of children and teens ate at least one of these combinations on a given day. "Pizza is the most frequently reported grain combination food among school-age kids," said Mickle. "They're also eating more tacos and burritos."

- \* Fruit consumption declines as children get older. Seven out of ten children under age five consumed some fruit or fruit juice on any one day, dropping to less than half among teens. This decline is not seen for vegetables. At least three out of four children, regardless of age, reported eating at least one vegetable on a given day. "What is of interest are the vegetable choices," said Mickle. "White potatoes—particularly french fries and potato chips—were most popular followed by tomato products, including spaghetti-type sauces and salsa."

- \* "Low on the vegetable hit parade are green beans, corn, green peas and lima beans, with less than 16 percent of children or teens reporting having eaten them on a given day," she added. And the percentage was even lower for the nutrient-packed dark greens or deep yellow vegetables.

- \* Today's kids are consuming less fat as a percentage of total calories, reflecting the trend for the population as a whole. In 1994, fat intake ranged from an average of 32 percent for teen girls to 34 percent for preschoolers. That's compared to the 37 to 40 percent range in the late 1970's.

- \* Children and teen-aged boys are meeting the Recommended Dietary Allowance for most nutrients, but teen-aged girls averaged 85 percent or less of the RDA for calcium, magnesium, zinc and vitamin E.

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extra calories. So researchers tested the thesis by feeding a small group of men in their 60's and 70's and another group in their 20's an extra 1,000 calories a day for three weeks.

Both age groups had an increase in metabolic rate, but the older group had a smaller increase, the researchers reported in the *Journal of Gerontology* (vol. 51A, no. 2). The difference amounted to about 87 calories a day that the older group would store as fat if they didn't increase their exercise. That adds up to an extra 2.2 pounds per year or 22 pounds a decade, the researchers estimate.

On any given day, people may fluctuate between eating 500 to 1,000 calories more or less than needed. So the men's ability to 'save' calories in times of scarcity was also tested by giving them 750 calories less than needed to maintain weight for three weeks. In this case, both groups decreased their metabolic rate about the same.

Earlier, the researchers reported that the young group automatically reduced their calorie intake after the overeating period, whereas the older group continued to overeat. Taken together, the findings help explain why body fat creeps up in older men.

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## **Arthritics Respond to Strength Training**

A group of people with rheumatoid arthritis improved the strength of major muscle groups by an average 57 percent with three months of resistance training. And they walked faster, had better balance and reported feeling less pain and fatigue, even though they had been under medication to control the general inflammation and joint pain caused by the disease.

About one percent of the U.S. population and three to five percent of people over age 60 have rheumatoid arthritis (RA)—the most common autoimmune disease. RA can be a model for studying old age because it mimics several conditions in the elderly, such as a drop in growth hormone and a higher rate of protein breakdown causing a loss of body cell mass, primarily muscle. Researchers wanted to see if these conditions could be slowed or reversed by twice-per-week workouts on chest press, leg press, leg extension, back extension and abdominal curl machines set at 80 percent of the maximum weight each volunteer could handle.

Eight middle aged RA patients worked out with a group of healthy people in their twenties and another in their seventies so researchers could compare their training responses. As published in *Arthritis & Rheumatism* (vol. 39, no. 3, and in press), RA patients actually had a larger gain in strength than the healthy individuals but started the study significantly weaker. So by the end of the study, their strength level was comparable to prestudy levels of the



healthy volunteers. And their protein breakdown rates were closer to those of the healthy individuals.

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### **Extra Calcium Overrides Poor Absorption**

A genetic variation that may increase risk of osteoporosis can be counteracted by raising calcium intake, according to a study of 60 women. When the intake was 1,500 milligrams a day, the 26 women who had the genetic variant absorbed just as much calcium as the 34 women with a normal gene. But when calcium intake was reduced to less than 300 mg/day, those with the variant absorbed significantly less.

That's because intestinal cells have to actively pump in the calcium when the supply is scarce rather than letting it seep in when there's plenty. And active absorption requires vitamin D and a functional vitamin D receptor—a molecule that sits at the surface of cells and hooks up with the vitamin to activate the process. The "osteoporosis gene," discovered in 1994 by an Australian scientist, is a variation of the vitamin D receptor gene that apparently renders the vitamin D receptor less efficient.

The findings are published in the *Journal of Clinical Endocrinology and Metabolism* (vol. 80, no. 12). They are consistent with earlier results in this laboratory showing that the association between the osteoporosis gene and hip bone loss depended on the calcium intake level. And it may explain why some studies have seen a relationship between the genetic variation and bone mineral density while others have not.

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### **Cutting Calories May Cut Immunity**

Reduced-calorie diets that provide nutritious, well-balanced meals might nevertheless weaken the body's immune system, according to a five-month study of 10 young and middle-aged overweight women. After the women consumed diets providing only half their usual calorie intake, they had a 30 to 35 percent drop in the number of circulating natural killer cells and a 10 to 15 percent drop in three immune system proteins (IgG, IgA and C3) present in blood serum. And during the last five weeks of the study when the women were given enough calories to maintain their new weights, immune system indicators still did not return to pre-diet levels. The findings are published in the *European Journal of Clinical Nutrition* (vol. 48, no.1).

Although the volunteers remained healthy throughout the study, these preliminary findings suggest that a similar decrease in immune status may be detrimental to the elderly and other groups with a weakened immune system.

One third of all Americans are overweight, and many choose to cut calories to shed pounds. The scientists wanted to determine how moderate calorie cutting affects the immune system because most of what is known is based on extreme cases, such as anorexia nervosa or starvation. The volunteers ate about 1,300 calories a day for 12 weeks. Whether or not the changes in immune system indicators are clinically significant will need further study.

For more information, contact Darshan S. Kelley, (415) 556-4381, Western Human Nutrition Research Center, San Francisco, CA; no e-mail address.

### **Lower-Salt Pickles**

Salt in dill pickles can be cut by as much as 40 percent through a new pickling formula. This ARS-developed formula also provides four percent of the daily requirements of calcium, potassium and magnesium per one-ounce serving in exchange for the salt removed. Not yet in commercial use, the formula is the result of a year-long study. It is based on the idea of salt substitutes that contain equal amounts of sodium chloride and potassium chloride. Regular pickles are about two percent salt, but the new formula replaces 40 percent of that salt with potassium chloride. Calcium chloride and magnesium chloride are added to provide nutritional balance. Citric acid and hot sauce are included for flavor. Taste testers from the staff, faculty and students at North Carolina State University gave the product a good flavor rating.

For more information, contact Roger McFeeters, (919) 515-2979, Food Science Research, Raleigh, NC; e-mail: [rjm@unity.ncsu.edu](mailto:rjm@unity.ncsu.edu).

### **A Parasite That's Not Stopped Cold**

From the parasite in drinking water that sickened thousands in Milwaukee in 1993, more bad news: Cold doesn't necessarily stop *Cryptosporidium parvum*. It was once

#### **Western Center to Move**

The Western Human Nutrition Research Center--housed at the Presidio of San Francisco since 1980--will move to the University of California at Davis, possibly in as few as three years. The new setting will strengthen ARS's interactions with university colleagues in nutritional sciences and allied fields and should enhance opportunities for new and innovative collaborations. The Western center is one of five ARS nutrition research centers nationwide.

thought that this waterborne, infectious parasite could be killed by freezing. But new ARS studies show oocysts—egg-like forms of the parasite—are still potent even after days of freezing temperatures.

Oocysts were alive and infectious after being frozen in water at 14 degrees F for a week, at 5 degrees F for a day, and at 4 degrees below zero F for eight hours. Most household freezers run between plus 5 and minus 4 degrees F. So ice made from oocyst-contaminated water must be considered infectious until it has been held at least 24 hours before use, according to the data published in *Applied and Environmental Microbiology* (vol. 62, no. 4).

Another unhappy conclusion: Oocysts have the potential to survive mild freezing temperatures in the environment and might be able to overwinter. *Cryptosporidium* infection in humans can be triggered by as few as 30 oocysts. *C. parvum* also wreaks havoc in livestock, causing severe diarrhea called “scours” in baby beef and dairy calves.

For more information, contact Ronald Fayer, (301) 504-8750, Immunology and Disease Resistance Laboratory, Beltsville, MD; e-mail: rfayer@ggpl.arsusda.gov.

## Pure Protein

A new refining process for soy protein yields a protein so pure it rivals synthetic proteins used by the pharmaceutical industry. That same protein also has great food potential—it could be whipped, for example, into fat-free dessert topping. The industry standard for concentrated soybean protein is about 60 percent purity. ARS scientists worked out the new process that results in a snow-white powder of nearly 100 percent pure protein.

Researchers have been using a high-protein soybean called Prolina to test the process. Currently, Prolina is being tested by tofu farmers who can earn premiums for the protein content of their beans. Prolina is high in S-11 proteins, which makes it easier to whip the protein or turn it into cheese substitutes and other fat-free foods.

For more information, contact Prachuab Kwanyuen, (919) 515-2734, Soybean and Nitrogen Fixation Research, Raleigh, NC; e-mail: prachuab\_kwanyuen@ncsu.edu.

## Tomorrow's Foods from Co-Op Research

Beta-glucans and other potential ingredients are being evaluated for food and beverage products under a cooperative research and development agreement with M&M/Mars of Hackettstown, NJ, the candy company. Beta-glucans are natural, high-fiber components of oat and barley flours. ARS scientists are fine-tuning techniques for milling beta-glucans from oats and barley. And they are investigating the potential of these compounds to improve glucose tolerance—the body's ability to regulate sugar levels in the blood. Improved glucose tolerance is thought by some to reduce risk of diabetes and cardiovascular disease. For more information, contact Wallace H. Yokoyama, (510) 559-5695, Cereal Product Utilization Research Unit, Albany, CA; e-mail: wally@pw.usda.gov.

Biodegradable food and beverage containers made with wheat starch may some day result from a cooperative research and development agreement with Tenneco Packaging, Inc. of Canandaigua, NY. Researchers will investigate techniques to process the starch. That way, equipment used to make food and beverage containers from petroleum-based plastics might produce inexpensive, starch-derived substitutes. The research could lead to low-cost, single-use containers readily disposable by environmentally sound methods such as composting. For more information, contact Gregory M. Glenn, (510) 559-5677, Cereal Product Utilization Research Unit, Albany, CA; e-mail: gmg@pw.usda.gov.

A low-fat alternative to french fried potatoes using rice could result from a formal agreement with Rishellco, Inc., of Crowley, LA. ARS researchers have found that using rice instead of potatoes lowers fat content in fries by up to 50 percent. Subtle differences in the chemistry of rice seem to make it better at keeping fat out. Rice fries can be flavored with onion or spices to make a tasty snack. The fries will be made from fine flour, using a machine similar to those used in making breakfast cereals. For more information, contact Ranjit Kadan, (504) 286-4332, Southern Regional Research Center, New Orleans, LA; no e-mail address.

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